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E-portfolios: an assessment tool for online courses

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Abstract

This article considers the various uses of e-portfolios in an educational context and looks at the particular characteristics of the electronic version of portfolios. It then focuses on the application of the e-portfolio as an assessment method. A case is made for the use of the e-portfolio as an appropriate end of course assessment process where learning objects are the basis of the course design. Evaluation data from such a course is presented. This is a post-graduate online course run by the Institute of Educational Technology at the Open University. Conclusions are drawn from the evaluation about the appropriateness of e-portfolios as an end of course assessment method.

E-portfolios in lifelong education

As with all terms that have acquired the prefix 'e', e-portfolios are an adaptation of the original concept, in this case portfolios, to the electronic domain. The 'e' could and no doubt will be dropped, but in the meantime, it is useful to highlight the specific features that electronic access and digitisation provide to the portfolio process compared to the paper-based versions of portfolios.

There are different uses of educational portfolios, prepared for different purposes and using different kinds of resources producing a taxonomy of electronic portfolios in order to discuss and classify examples:

- those for *developmental* purposes;
- those for *presentation* purposes;
- those for *assessment* purposes.

LaGuardia College in New York has embraced the e-portfolio developmental approach which they define as:

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A self-selected multimedia presentation of student work that offers a rich and textured view of a student's learning and development. In an ePortfolio, students collect and select materials from their college careers to create a body of work that represents their learning over the course of their education. Students then reflect on this work making important connections around career, community, personal and educational goals. The ePortfolio process at LaGuardia Community can be summarized as 'collect, select, reflect, and connect' (http://www.eportfolio.lagcc.cuny.edu).

The European conference on e-portfolios in 2003 places a presentational emphasis on the concept, with the conference web site emphasising the advantages of the electronic portfolio: An e-portfolio is an extended, dynamic CV, establishing links to an online database, which contains personal and professional achievements, team results, references and all relevant evidence of competence obtained in the course of work and learning. It provides an opportunity to reflect on one's own professional practice and to share the lessons learned with others (http://www.eife-l.org/portfolio).

California State University in Los Angeles, on the other hand, uses the term webfolios and claims that their use for assessment will have a great impact on both the breadth and depth of student learning, particularly in the context of distance education:

The webfolios may also be used as an authentic student outcomes assessment for the courses offered through distance learning as students are able to share their ideas and feedback. Their work-in-progress webfolios will be accessible to one another through the Web during the entire course period in a learning community created by technology. The webfolios provide a new perspective on student evaluation where students would learn to experience the synergy of collaborative learning rather than competitiveness experienced during testing or examinations. By sharing their resources obtained with one another, students become true partners in learning and develop their professional collegial relationships while they are in class. This also will overcome the isolation often felt by the students in distance learning classes. (http://www.ca.statela.edu/academic/webfolio/web1.htm).

So while some of the uses of e-portfolios are for short-term purposes, the basic concept is one where learners contribute continually to their portfolio throughout their learning life and draw on it for assessment, for job interviews and for maintaining a record of achievement.

Characteristics of e-portfolios

Looking at course specific applications only, a number of advantages of e-portfolios can be identified for each of the stages (collection, selection, reflection, projection, presentation) associated with portfolio use in the literature (Barrett, 2003).

- The process of *collecting* and *selecting* items for the e-portfolio is made easier because users can hold, organise and reorder contents easily and quickly. Being able to go back and re-work various components of the portfolio is a significant advantage of electronic portfolios. As a method of end-of-course assessment, e-portfolios provide many opportunities to integrate all of the student's work on the course and to connect new ideas with the student's existing knowledge and context. Collections can be the work of an individual, or assembled and shared by a group.

- A basic premise of portfolio learning is that *reflection* over time increases a learner's ability to make sense of concrete experience. Realisation of competencies comes through reflection on activities and products that the student experiences and generates in a social context (Cambridge & Cambridge, 2003).
- The process of *projection* (or direction) where students compare reflections, standards and performance indicators is particularly helped by an e-portfolio format. Such comparisons are facilitated by the connected nature of the e-portfolio and adjustments can be simply made to keep this 'live' and responsive. The potential to create a 'connected portfolio' (Barrett, 2003) offers an interactive process, in which students share their developing e-portfolios with teachers and other students. Being available electronically, e-portfolios can form the basis for collaborative commenting, revising and discussion.
- The e-portfolio offers a multimedia palette of *presentation* possibilities. E-portfolios can make use of audio and video files, graphics, references to external sources, photographs and other digital artefacts that add variety and interest to the portfolio. For assessment, students' ownership of their portfolio and their choice of items to submit or present make this a truly learner centred activity.

In terms of assessment, the e-portfolio provides the student with authentic, reflective, interactive and individual features, and all of these attributes have advantages over examinations and computer-assisted, multiple choice forms of assessment (Chang, 2001).

Standards and e-portfolios

What gives e-portfolios the edge over 'traditional' portfolios is the considerable increase in the number and quality of services that can be provided to individuals and the community, the portability and adaptability of the output and the potential to create central repositories (Ittleson, 2001). In order to realise these potential benefits e-portfolios must comply with interoperability standards such as document format (eg, pdf, html, xml, etc.), accessibility (eg, WAI), data format (eg, learner profile), authentification (eg, certificates), access right, etc. The IMS Global Learning Consortium is a key developer of technical specifications for e-portfolios and is currently producing a specification based on use cases submitted by e-portfolio developers and users working in all levels of education. IMS specifications such as LIP (Learner Information Profile) and content packaging, are some of the elements that could be included in future e-portfolio standards.

E-portfolios are not dissimilar, in the technical sense, to a collection of learning objects. That is, they assemble discrete pieces of electronically available material that can be manipulated, stored and re-versioned to suit different audiences. Just as learning objects can be stored in a learning object repository, students add new work to their e-portfolios over the period of their study and select the most appropriate items from this repository to present at the end of their course, or to an employer at the end of their degree. Adhering to standards allows these repositories (e-portfolios) to be re-usable over time, within different systems, conveniently accessible to different audiences as required.

An extract from a fictitious scenario about the use of e-portfolios illustrates the way in which e-portfolios resemble learning object repositories:

> I don't think an employer will take the time to look at my video from the play production. I have to decide on another piece of evidence that will crystallize my ability as a team player. Maybe I'll use two or three sequences from the transcript of a MOO session that my writing group had in which we divided parts of a research project. Each short quote might show a different skill, for example summarizing, persuading, and setting timelines for team results. Connecting to my college's portfolio community server, I'll look at the career e-portfolios of alumni from my school who got great jobs and see what other strategies they used to show that they worked well in teams. (Cambridge & Cambridge, 2003, p. 3)

This hypothetical student is re-versioning her electronic portfolio from a record of her undergraduate achievements to a CV to submit to a prospective employer. She needs both a range of different material to draw upon and way of seamlessly re-presenting it.

E-portfolio used with learning objects for end of course assessment (ECA)

The growth of interest in learning objects as a course design strategy parallels the growth in the use of e-portfolios. Both involve the same fundamental technology and both rely on the same components of re-use and selectivity. In this paper we present the data and results of an application of e-portfolios as the final assessment of a course designed in learning objects. Called *Learning in the Connected Economy* (LCE), the course represented one third of a Masters Degree in Online and Distance Education offered by The Open University. The programme is run entirely online and each course lasts for eight months. The pedagogical approach of the programme is constructivist and student-centred, using asynchronous collaborative discussion and online activities as the core learning modes. LCE had 45 students from 16 different countries.

What makes LCE different from the other courses on the programme, and indeed from most higher education courses, is that it is written entirely in learning objects. The learning object approach has generated a great deal of debate and much of it has centred on its potential to radically transform the manner in which learning material is produced, manipulated and experienced by the learner (Rehak & Mason, 2003). One of the many issues raised by the use of learning objects is that of customising course content to the individual learner. The use of learning objects does permit a level of student choice and selectivity which traditional narrative courses cannot elegantly provide. The granularity or size of learning objects is still very much open to different interpretations. Our view of learning objects is that of a microcosm or condensed set of components that give the learner an overview of the issue and ways of following up the ideas in more detail. The instructional design principle underpinning the approach taken to learning objects centres on the notion of the integrity and internal contextualisation of each object. So instead of making up a learning unit from many self-standing learning objects (eg, readings, pieces of interactive multimedia, an activity), each learning object was designed as a holistic learning experience with internal integrity as a unit of study. This results in a level of granularity somewhat larger than the norm, though it is difficult to speak of a norm in an area as volatile and experimental

as learning objects. What this approach does do, is place the notion of a learning object and hence a course made from learning objects in a pedagogical framework that we call holistic. (See Weller, Pegler & Mason (2003) for more details of the course design. Refer to http://iet.open.ac.uk/coursesonline for details of the course content.)

LCE learning objects, in keeping with the essence of the concept, are stand alone and do not refer to each other. The content of the course, the pedagogical approach and the emphasis on learner choice in the presentation as learning objects all dictated the use of an e-portfolio as the primary assessment method. This substituted for the more traditional ECA as a project or extended essay and accounted for 50 per cent of the overall mark—the balance was based on performance on four continuous assessment assignments, one at the end of each module. Passing the ECA was necessary to successfully complete the course.

Our intention in using this form of assessment was to design a course that offered students an integrated learning experience in which they could work through a wide range of activities and choose amongst these items of evidence for the ECA e-portfolio. The course consisted of over 100 learning objects of which 55 we designated as possible options to use in the ECA. Students were asked to select two activities from each of the four modules, making eight pieces of work in total. They were also required to reflect on their choices in a 2,000 word overview commenting on how their chosen activities supported their argument on the key statement: 'Increased connectivity is bringing about a fundamental change in all aspects of learning.'

As connectivity (eg, Weller, 2002) was a major concept on the course and was discussed throughout the four modules, this overview question was intended as a vehicle for students to summarise their view of the course content and processes. As one aspect of connectivity, at least two of the pieces of 'evidence' chosen for the e-portfolios had to result from online collaborative activities, while the rest could be from a range of individual online activities. Some of the activities involved writing; a few required Powerpoint or spreadsheet outputs, some required exploration of unfamiliar technologies; many involved searching on the web; others required online discussion or interaction amongst students in small groups.

Most of the learning objects consisted of three elements:

1. An overview of the topic, highlighting the core issues, problems or ideas.
2. Links to further resources, web sites or journal articles for further reading. These were carefully selected by the course team to provide opportunities for both corporate and higher education students to engage with the topic from a perspective with which they would have some familiarity.
3. One or two activities, some individual, some collaborative that form the basic experiential pedagogy of the course. Some of the activities involved writing; a few required Powerpoint or spreadsheet outputs; many involved searching on the web; others required online discussion or interaction amongst students in small groups.

To give an example of a collaborative LO, an extract is given below from the activity on Instant Messaging (IM):

In this activity you take the role of a person who has been assigned the task of exploring the possibilities of IM for use as a learning tool within your organisation (or one that you are familiar with). This will require you to be able to install some software, and on your own initiative explore its various functions. You will download an IM client and use it to communicate with other students and course team members. Your experience of using the client and the background reading above will then enable you to consider the potential of IM as an educational tool.

Once you have explored the use of the client over a reasonable length of time (this will vary depending on how successful you have been in communicating with others), you should prepare a report that covers the following aspects:

- background—based on your reading give a brief overview of the use of IM;
- your own experience—how successful were you in using IM? What was your personal experience of using the software?;
- advantages and disadvantages of IM over other forms of communication;
- type of learning—suggest the type of learning (in terms of learning styles or scenarios) IM might support within the organisation;
- your final recommendation about its use.

One of the core principles of the course was that of choice—giving students opportunities to select which learning objects to complete, depending on their personal interests, job relevance or time and inclination. The advice given to students about choosing which learning objects to study in detail was that they should follow their personal or professional interests. No advice was given about how to select LOs to submit in the portfolio, but the marking criteria were given to students as part of the assignment details.

Evaluation and results

The effectiveness of the e-portfolio approach was evaluated in a number of ways by the team involved in the development and presentation of the course:

1. 31 of the 41 students who finished the course were interviewed by telephone and their comments transcribed.
2. During the course, students were invited to complete a web questionnaire. This was based on several open-ended questions covering their views of the course structure, use of learning objects, and attitudes to making choices.
3. Statistics from students' choice of submitted learning objects were analysed (see Figure 1)
4. The e-portfolios were read, double-marked and analysed.
5. Messages to the ECA and other discussion forums were analysed.
6. Feedback from tutors was sought.

In the web questionnaire and during the telephone interviews students were asked to comment directly on how they worked through the course, how they made choices about what to study and how they chose which learning objects to submit in their portfolio. A third of students interviewed reported difficulties with the necessity to make choices: they worried that the learning objects they worked on during the course were not the best ones to submit in their portfolio; they felt overwhelmed by the number of topics; they felt guilty about not working through all the material provided.

Figure 1 presents an analysis of the eight choices students made in assembling their e-portfolios. Modules 1, 3 and 4 had 12 to 13 LOs that could be used in the portfolio, but Module 2 had 19. It is evident that a very high proportion of the usable learning objects were in fact used—53 of a possible 55. The data also shows that by the time students reached the later modules in the course, they were much more strategic in their choices. Almost half of the students submitted the same three activities in Module 3, though the other half drew from learning objects spread relatively evenly across the other choices. Figure 1 also shows that in Module 1, at the start of the course, there were no very clear favourites amongst the ECA choices whereas in each of Modules 2, 3 and 4 three activities were selected by 10 or more students. The three most popular activities in each case included at least one of two collaborative activities in that module, and by Module 4 the collaborative activities accounted for the top two choices (indicating that some students may by then have realised that they required additional collaborative activities to fulfil ECA requirements).

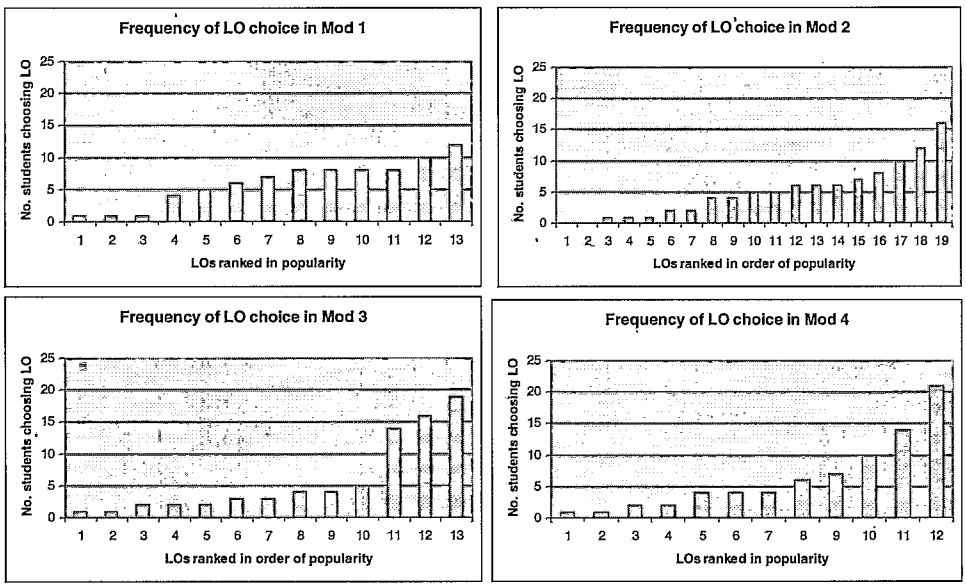

Figure 1: Relative popularity (frequency of selection) of learning objects across the four course modules

Evidence from the content of the e-portfolios submitted indicates that 90 per cent of the students engaged very satisfactorily with the portfolio statement and the concept of learning objects as supporting evidence. All of the e-portfolios achieved at least a pass grade, using double marking and an external examiner.

Discussion

A number of issues emerge from this qualitative and quantitative data and this is already being used to refine the course and the e-portfolio approach for the second presentation in 2004. The foremost of these is the question of choice and the extent to which this benefited the learner. The second is the integrative function of the e-portfolio both from the instructor and student points of view. Did the e-portfolio approach help students to engage with the core ideas of the course? The third is the ownership issue and the extent to which e-portfolios enabled students to take responsibility for their own learning.

Choice as a teaching strategy

It became apparent from the evaluation responses that the amount of choice demanded by the course required a relatively sophisticated, self-directed and confident learner to really benefit from this strategy. As the majority of students were graduate professionals with clear aims in studying the course, this choice about what to study and what topics to submit as polished pieces of work, really suited their learning needs very well. It provided great flexibility to adapt the course to their employment context and to fit around other commitments. The use of learning objects which generally consisted of three to five hours of work made it very easy to study in short evening sessions.

However, it was evident in the feedback from students that the course designers needed to be much clearer in their instructions about making choices as many students had tried to do all the activities, at least for the first two modules. One unexpected difficulty with the choice strategy was that even students who understood the skill we were trying to develop through the provision of a wide range of materials, found all of the topics and activities so interesting and absorbing that they wanted to do all of it! One such student who worked through all of the learning objects commented in the telephone interview: 'I did [the course] to see the horizon; I got that overview and that's what I wanted.'

However, even with these patterns of increasingly strategic choice, students continued to choose activities across the range. They clearly exercised their choice to select and present evidence which their peers may not have used—in every module 3–5 students chose activities which only they, or they and one other, selected. This ability to exercise choice, extending to choosing unpopular activities, is one which is not normally supported in distance education.

E-portfolios as a course integrator

Two thirds of the student feedback was very positive about the integrating effect of the e-portfolio. Comments like the following were typical: 'A great idea—it assessed the

whole course', 'it really brought the course together' and 'it gave lots of elasticity to choose'. However, there were complaints that it was a lot of work and that there was a tension between choosing activities from personal interest and having to support an argument in the final submission. One student found the portfolio approach 'bitty'.

Feedback from one pedagogically aware student showed an understanding of the aim of using e-portfolios:

> The e-portfolio was a big step towards affirming what we had learned—it brought together some of the work we had done during the course and forced us to reflect and link these LOs together. Pedagogically this is very sound. It allowed us to individualise our final piece of work, which considering the groups were made up of diverse interests (teachers, designers, managers, etc.) was very important and very clever. It also allowed those of us who had not looked at every LO to hand in a complete work. Those that had looked at more LOs than others would hopefully be at an advantage.

Learner-centredness

In designing the course and specifically in estimating possible learning object study times we were aware that—depending upon student interest—this could range from >1 hour to <10 hours to follow links, research sources and prepare as ECA evidence. In the student interviews this view was supported by comments such as 'I tried about 60% of the objects, read about 80% and completed about 30%'. The strategy of learner choice, specifically selecting which objects to concentrate on or how to allocate time and effort amongst objects, was a large part of the learner-centred approach of the whole course. The pedagogical rationale was that in this age of information explosion, we need to be able to quickly assess the value of information, particularly online information; we need to be comfortable with non-linear approaches to reading and searching for information and we need to be able to identify information relevant to our own requirements, and be selective in applying it to the appropriate context. These are not simple skills that are easily acquired. It takes practice, guidance and effort to develop real expertise. The top 50 per cent of the portfolios show evidence that the student was well on the way to acquiring this expertise and found the course did provide the practice and guidance they sought.

In 2004 the course structure will make more explicit during the Induction stage that there are different study strategies, and that students do not have to complete all the activities or complete them all to the same depth/intensity. This follows from student feedback that this was not initially apparent to 2003 students:

> The course structure was fine, but needs to be made clearer at the outset that you don't need to do every activity—once this was clear you could really tailor the course to your own needs. That you were able to select what you studied—yes I was able to focus more on what I wanted to learn in more depth, those which I could apply to my professional work and personal interest.

There is well researched evidence (Bolander, 2000; Macdonald, Heap & Mason, 2001) that students need scaffolding and support to become independent learners—in short,

they need hand-holding to become hands-free! One of the students acknowledges this in her portfolio evidence:

> These hands-on, self-directed activities may at first appear alien to learners, who are not used to organising or directing their learning activities. It may raise issues of time management, as it is more difficult to predict the time required for self-directed activity.

Another student without the normal undergraduate degree (but with years of relevant work experience in lieu) said, 'The final assessment was the hardest thing I've ever done!!! I couldn't see how it all linked together till the end... I wanted you to suggest a path, but I knew that it was the point of the course to learn to choose myself'. In fact this student's portfolio was very good, which is evidence that learner-centredness is less an issue of course pedagogy and more one of learner confidence and attitude.

Conclusion

Evidence from the e-portfolios, student feedback and course evaluation supports the course team's aim of producing a holistic course in which the pedagogy, learning object approach and assessment strategy were an integrated whole. It also met our requirements for authenticity in the assessment process which is intimately linked to the content of the course, rather than being a 'punishment' at the end of the learning process.

The use of choice, in the study of the course and in the e-portfolio submission, needs further reinforcement in future presentations through greater clarity of instructions from the course team and through interventions by the tutors for students who need more scaffolding. Our students are not initially prepared to make choices and some have reported 'guilt' in passing over material, although as the course progressed they clearly appreciated and used their choices, recognising that 'it gave lots of elasticity to study what was most appropriate'. There will always be a spread of competencies amongst any student cohort such that some students will need more support and confidence building than others. In our view this does not justify designing courses for the lowest common denominator. The quality of work produced by at least half of the students and their enthusiasm for both the content and approach of the course provide ample justification for the demanding and relatively novel structure of this course. It also, through the provision of choice, met the demand for a flexible assessment which would be equally relevant to students from corporate and educational institutions.

Our initial approach of designating some of the learning objects as suitable for the portfolio and some not, was clearly a mistake and added unnecessary complications for students. We have now made all learning objects potentially suitable for the portfolio.

The evidence also supports our hypothesis that e-portfolios can be a fitting assessment model for courses designed in learning objects. E-portfolios consist of discrete pieces of work and this mirrors the structure of learning objects, particularly those which are activity based.

The e-portfolio as a form of multimedia, ever-developing CV has obvious benefits for the pursuit of lifelong learning. As a method of assessment, the e-portfolio builds independence and learning-to-learn skills, which are necessary components for the lifelong learner.

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